Issues Relating to the Rocky Flats Cleanup

U.S. Department of Energy, Rocky Flats Project Office
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1. **Issue: Rocky Flats has been extensively characterized to identify the nature and extent of contamination resultant from the weapons production mission.**

The Rocky Flats Environmental Technology Site (RFETS, Site or Rocky Flats) has been extensively characterized including groundwater, surface water, soil and air monitoring and sampling; satellite imagery; investigation of areas identified by Colorado Department of Public Health and Environment (CDPHE); interviews with former and present Rocky Flats workers; and by walking the Site to identify potentially disturbed areas. This investigation has resulted in removal actions, in-place remediation of groundwater and, in some cases, no required action. In addition to these actions, additional characterization will be completed, even in areas where there is no suspected contamination.

A comprehensive summary of historical information on environmental releases at Rocky Flats was first prepared in 1992 as the Historical Release Report. To prepare this report, Site personnel reviewed all data and documents available at that time to construct a list of Individual Hazardous Substance Sites (IHSSs) and other areas of concern. More than four thousand documents were reviewed during this process, and more than 2,000 interviews were conducted with then-current and former Rocky Flats workers who were believed to have knowledge of possible environmental releases. Included in the data reviewed was a site-wide survey conducted from 1977 to 1984 using hand-held instruments, the purpose of which was to look for radioactive "hot spots." Based upon these data and other information, we have identified 360 IHSSs and other areas of concern; of note, Rocky Flats Project Office (RFPO) anticipates that about 250 of these areas will be found to require no additional remedial action.

Since the early 1990s, the Department of Energy (DOE) and its contractors and other entities have taken thousands of soil measurements for plutonium and other contaminants in and around Rocky Flats. These samples have been gathered in accordance with sampling plans and protocols that have been approved by CDPHE and the Environmental Protection Agency (EPA), and are consistent with results gathered from other independent investigations. These samples clearly demonstrate a pattern of contamination on and near Rocky Flats that is consistent with historical evidence described above. Plutonium and americium contamination in soils at Rocky Flats emanated almost entirely from the drum storage area known as the 903 Pad. From 1958 to 1969, drums containing plutonium-contaminated lathe coolant were stored on the Pad, located in the southeastern part of the Industrial Area. These drums leaked, and wind and water erosion carried plutonium and americium in a well-defined pattern to the east and southeast, past the eastern Site boundary in some places. The DOE and its contractors have recently used the available soil data and a series of new measurements to produce statistically-based maps of plutonium concentrations, employing a technique known as kriging. The attached map used 2,468 soil plutonium measurements to produce the contours of plutonium concentrations.

Finally, the CDPHE reviewed aerial photographs of Rocky Flats dating to the early 1950s to determine whether additional, as yet undiscovered areas of dumping or other sources of contamination might exist. As a result of this review, CDPHE forwarded a list of sites in the Rocky Flats Buffer Zone to RFPO that it believed warranted further examination. The RFPO and its contractors have evaluated these sites and, in consultation with CDPHE, have integrated the results of this evaluation into the cleanup program.

2. **Issue: The cleanup has a solid scientific foundation and has undergone extensive independent oversight.**

A thorough, scientific understanding of the behavior of contamination in the Rocky Flats environment is crucial to the successful cleanup of Rocky Flats. Equally crucial is independent oversight and evaluation of the cleanup levels that will be used. In both areas, Rocky Flats has sought and received the oversight of independent scientists.

In 1996, to address the question of how radioactive elements move in the environment, Rocky Flats commissioned the Actinide Migration Evaluation (AME). The AME Advisory Group consists of nationally recognized experts from DOE's national laboratories. The AME performed basic research into the behavior of plutonium, americium and uranium at Rocky Flats, and presented its summary findings in its Pathway Analysis Report, released in 2002. These findings are helping to guide the ongoing cleanup and will be used to help determine the long-term monitoring of Rocky Flats after closure.

In the late 1990s, in response to public concern over radionuclide soil action levels (RSALs) that had been adopted by DOE, CDPHE and EPA pursuant to Rocky Flats Cleanup Agreement (RFCA), DOE funded the Radionuclide Soil Action Level Oversight Panel (RSALOP). The RSALOP was a citizen panel (DOE was not a member) that in turn commissioned a private firm to independently analyze the RSALs that were in place at that time. Using conservative assumptions and scenarios (including a resident rancher living permanently at the Site), the RSALOP's technical consultant recommended a level of 35 pCi/g of plutonium as a soil action level for the resident rancher at Rocky Flats. This corresponds favorably to the RSAL ultimately selected by the RFCA parties of 50 pCi/g of plutonium, employing a scenario designed to protect a wildlife refuge worker.

The Rocky Flats cleanup continues to have independent oversight from our regulators, CDPHE and EPA, who have approval authority over all cleanup actions, as well as the determination of the risks that the Site will pose after cleanup. The CDPHE and EPA must approve the final Site Corrective Action Decision/Record of Decision, which will help determine the long-term stewardship requirements at Rocky Flats. As part of the cleanup process, DOE receives input, in a non-regulatory role, from the U.S. Fish and Wildlife Service (USFWS), to help ensure consistency between cleanup actions and wildlife refuge management. Finally, as required by the Rocky Flats National Wildlife Refuge Act, no part of Rocky Flats may be transferred to USFWS until EPA certifies that the cleanup has been completed and that the remedy is operating properly.

3. Issue: The cleanup is conservative and will provide a safe area for visitors and wildlife refuge workers.

When cleanup is completed, all of Rocky Flats, including the lands that will continue to be retained by DOE, will be safe for both the wildlife refuge worker and for the visitor to the refuge. The DOE anticipates that the risk posed to the refuge worker by the contamination remaining at Rocky Flats after cleanup will be no more than a one in 100,000 excess chance (1×10^{-5}) of contracting cancer because of exposure to this remaining contamination. This risk level is ten times more conservative than EPA's minimum guidelines (which prescribe a residual risk of no more than one in 10,000 to the likely future land user) for the cleanup of Superfund sites. The actual risk posed by the Site following cleanup is currently being calculated as part of the Comprehensive Risk Assessment, a process that has the participation of, and will ultimately be approved by, CDPHE and EPA.

In 2002, DOE, CDPHE and EPA released a series of reports that formed the basis for the surface soil action level for plutonium of 50 pCi/g. By contrast, the previous RFCA soil action level for plutonium, released in 1996, was 651 pCi/g. These reports, written by the RSAL Working Group, received extensive, independent, scientific peer review, as well as public review. Using conservative assumptions for environmental exposure pathways, site-specific parameter values where possible, and a probabilistic calculation methodology developed for the RSALOP, the Working Group calculated the risks posed by plutonium concentrations in soil for various exposure scenarios, for both children and adults where appropriate. These risks are chronic, assuming a 30-year exposure period, and are summarized in the following table.

	Risk Level		
Land Use Scenario	**10^{-4}**	**10^{-5}**	**10^{-6}**
Wildlife refuge worker	908 pCi/g	91 pCi/g	9 pCi/g
Open space user	960 pCi/g	96 pCi/g	10 pCi/g
Rural resident	183 pCi/g	18 pCi/g	2 pCi/g

These table values indicate that the final action level of 50 pCi/g is protective not only of the refuge worker and the open space user, but would also be protective of a resident, according to EPA guidelines. This action level will result in significantly more surface soil cleanup than the previous action level of 651 pCi/g.

Cleanup of the subsurface environment at Rocky Flats is also being done to ensure that the risks posed by remaining contamination do not exceed one in 100,000 to the wildlife refuge worker. For non-radioactive contaminants, removals will be done if the amount and the depth of contamination indicate that they would pose an unacceptable risk to the refuge worker. For plutonium, the recent modifications to RFCA contain a series of soil concentrations and extents of contamination that will cause the removal of contaminated soil. The DOE, CDPHE and EPA believe that this will result in a Site that will be safe in its entirety for the refuge worker and visitor.

While all of Rocky Flats will be safe for its intended use as a wildlife refuge after the cleanup is complete, certain areas will be retained by DOE. This land will be retained to help ensure that certain activities that could pose an unacceptable risk because of contamination remaining in the surface or subsurface, do not take place. These activities could include construction of offices or other occupied structures, subsurface excavations, drilling of wells into contaminated groundwater, and disturbance of surface soils without adequate erosion control. The possible extent of lands retained by DOE is shown in the attached map. The precise nature and extent of the lands that will be retained by DOE and the types of restrictions that will be placed on these lands are currently being determined by DOE, CDPHE and EPA as part of the process that will lead to the Corrective Action Decision/ Record of Decision (CAD/ROD).

4. Issue: This cleanup has enjoyed unprecedented public involvement.

Every aspect of the cleanup at Rocky Flats, including the emerging plans for management of the Site following closure, has received the benefit of early, extensive public involvement. In particular, the Rocky Flats RSALs were developed with extensive public dialogue among State and Federal regulators, stakeholder organizations, elected officials and members of the general public. The RFCA Parties (DOE, CDPHE and EPA) worked collaboratively with local governments and the community over a two-year period to establish the revised RSALs. This dialogue

included consideration of technical and policy issues related to adopting a consistent risk-based approach for accelerated actions for surface soil, subsurface soil and water.

The RFCA Focus Group, comprised of representatives from local governments and public interest groups as well as interested citizens was established in 2001. This group met monthly with the RFCA coordinators over a two-year period to provide public input and community perspectives on issues related to the soil action levels, and broader issues relating to community priorities for remediation of Rocky Flats.

In addition to numerous hours of public dialogue of technical and policy aspects of soil cleanup levels, DOE provided funding to conduct a stakeholder-led, independent, scientific study of cleanup levels (the RSALOP, discussed above), and funded an independent peer review of the scientific, modeling and regulatory aspects of the RFCA parties' review of cleanup levels. The public dialogue has been a catalyst for inquiry, a forum for debate, and has ultimately been beneficial to the decision-making process. The public dialogue was also instrumental in identifying public preference for a risk-based approach to soil removal, which will ultimately result in considerably more removal of plutonium-contaminated surface soil than was originally envisioned.

Proposed changes to several attachments to RFCA, including the proposed RSAL changes, were released for a 60-day public comment period from November 12, 2002, through January 13, 2003. The public process influenced decisions to switch from a dose-based approach to a risk-based approach, to analyze residential use scenarios in addition to the wildlife refuge scenario; and to conduct independent peer review of the agency technical work products. In addition to the public comment period, information was also shared through briefings to employees, municipal and county government agencies, business groups, stakeholder groups, and regularly scheduled public forums (i.e., Rocky Flats Coalition of Local Governments (RFCLOG) monthly meetings, Rocky Flats Citizens Advisory Board (RFCAB) monthly meetings, etc.).

The public process surrounding the recent changes to the RSALs was exemplary of the ongoing public involvement process used in the Rocky Flats cleanup and closure project. All cleanup decisions receive early, informed public scrutiny, as documents are usually shared well before formal public comments begin, and upcoming actions are discussed with stakeholders early in the planning stages. The DOE and Kaiser-Hill provide briefings on current issues at established forums such as RFCLOG and RFCAB, but have also established regular forums on topics of particular community interest, including the Long-Term Stewardship Working Group, the Water Working Group, and monthly meetings on Environmental Restoration and Decontamination and Decommissioning projects.

Additional public involvement activities include two upcoming workshops in April. RFPO will host an availability session April 14 from 6-8 p.m., at the Broomfield City Hall to discuss cleanup questions raised during the USFWS Comprehensive Conservation Plan (CCP) public meetings. The RFCA parties and USFWS representatives will be available to answer questions and discuss the relationship of the cleanup to the management of the refuge.

In addition, on April 21 the Site will host a workshop to discuss ongoing transition activities from Environmental Management (EM) to Legacy Management (LM). Environmental Management will transfer management of the lands that DOE retains to DOE's newly-formed Office of Legacy Management. This workshop will be the initial opportunity for public involvement to discuss post-closure activities.

5. Issue: The path to completion

In order to complete the cleanup and closure of Rocky Flats, DOE must follow a series of regulatory steps prescribed in RFCA. The RFCA establishes the regulatory guidelines and framework for achieving the cleanup of Rocky Flats and is a legally binding agreement among the CDPHE, EPA and the DOE to accomplish required cleanup of radioactive and other hazardous substances at the RFETS. Additionally, the Rocky Flats National Wildlife Refuge Act prescribes an additional step to ensure that the lands transferred to USFWS are suitable for use as a refuge. The major regulatory steps are as follows:

1. RCRA Facility Investigation-Remedial Investigation Corrective Measures Study-Feasibility Study (RFI-RI/CMS-FS): DOE believes that the cleanup actions that have been and will be performed at Rocky Flats are consistent with the requirements of RFCA, and that no further remedial actions will be required when these interim actions have been completed. However, the residual risks posed by Rocky Flats after all of these actions are complete will be analyzed in the RFI-RI (in an analysis known as the Comprehensive Risk Assessment) to ensure that what is left behind conforms to the acceptable risk to the future land users (Rocky Flats Wildlife Refuge worker). Based on this, the CMS-FS puts forth a proposed alternative which will identify post-closure activities and any additional actions that DOE may need to take.

2. Proposed Plan: Following the RFI-RI/CMS-FS, another document called the Proposed Plan is developed and released for public comment. The Proposed Plan is a synopsis of the proposed alternative developed in the CMS-FS, and is expected to discuss DOE's post-closure activities such as additional environmental monitoring and land use controls.

3. Corrective Action Decision/Record of Decision (CAD/ROD): After public comment is incorporated, the Proposed Plan becomes the basis for the CAD/ROD, which the RFCA parties sign. The CAD/ROD will determine the final action for the Site and is anticipated to occur following physical completion of cleanup and closure work at the Site.

4. The post-closure RFCA: The RFCA parties are negotiating a post-closure RFCA (revision of the current RFCA), a regulatory agreement which will implement the terms of the CAD/ROD and will take effect when the CAD/ROD is signed.

5. EPA Certification: Before DOE can transfer any land to USFWS, EPA, under the terms of the Refuge Act, must certify that the cleanup is complete and the remedy is operating successfully. After EPA certification, DOE will transfer most of Rocky Flats to USFWS.

6. Periodic Review: A periodic review of the remedy is required by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This review will take place at least every five years and will determine whether the remedy at Rocky Flats remains protective of human health and the environment, or if additional actions need to be taken by DOE.

Following the completion of cleanup and closure of Rocky Flats, the DOE Office of Environmental Management, which is responsible for the cleanup (and of which RFPO is a part), will transfer management of the lands that DOE retains to DOE's newly formed Office of Legacy Management. Legacy Management will be responsible for the long-term management of lands retained by DOE, and for compliance with the long-term requirements outlined in the CAD/ROD and implemented through the post-closure RFCA. LM will also be responsible for other post-closure responsibilities, such as administering retiree benefits and records management.

6. Issue: What will the Site look like, surface and subsurface, when the cleanup is completed and how will it be managed afterward?

The physical condition of Rocky Flats at closure is being determined primarily by two documents, RFCA and its attachments, and the DOE closure contract with Kaiser-Hill. Completion by Kaiser-Hill of the work scope under the contract is known as physical completion. While certain regulatory and contractual decisions have yet to be made, DOE anticipates that, at physical completion, the Site will have the following general characteristics:

- all buildings will be removed, with foundations being removed to at least 3 feet below final Site grade;
- all waste will be removed, presuming a storage or disposal pathway is found for certain "orphan" wastes; clean building rubble will be used as fill;
- surface soil contamination will be removed to conform with RFCA soil action levels, including the removal of plutonium to levels less than 50 pCi/g;
- subsurface soil will be removed consistent with RFCA action levels, and the Original Process Waste Lines will be removed to 3 feet below final grade, plugged and left in place if within 6 feet of final grade, and have associated contamination removed consistent with RFCA Attachment 14; deeper lines will remain in place unplugged;
- at least three, and possibly more, passive groundwater collection and treatment systems will remain in place to treat groundwater contaminated with volatile organic compounds, nitrate and uranium, thereby protecting surface water; shallow groundwater contamination will remain in and around the former Industrial Area;
- surface water leaving the Site will be suitable for all uses, including drinking water, conforming to very conservative standards;
- engineered soil covers will be placed over the Original and Present Landfills;
- most roads, parking lots and culverts will be removed, and the Site will be re-graded as necessary to provide stability, and re-vegetated using native seed mixes;
- most retired subsurface utilities will remain in place, with facilities such as sewer lines being plugged; and,
- monitoring equipment, including groundwater monitoring wells, will remain in place to provide long-term information on environmental conditions at the Site.

Much of this work is under way, and certain major components of the closure project, such as the removal of weapons-grade plutonium and fissile uranium, have already been accomplished, and the majority of urgent risks have already been removed. The closure project is currently on schedule and under budget (the closure contract has a target cost of $3.963 billion) for a completion date of no later than December 2006. The DOE anticipates that Site maps detailing overall Site conditions will be prepared prior to final Site closure, and conditions remaining following cleanup activities will be documented in individual closeout reports required by RFCA. Decisions regarding fencing of the areas retained by DOE have not yet been made, although DOE anticipates that such decisions will be made on the basis of refuge management, since fencing will not be required to protect public safety.

The regulatory requirements for DOE's post-closure management of Rocky Flats are likely to include such things as land use restrictions, environmental monitoring, maintenance of the remedy, and records management. These items are being negotiated now among DOE, CDPHE and EPA, as part of the CAD/ROD and post-closure RFCA processes described in Issue 5, above. The DOE anticipates that expenses associated with the environmental management of Rocky Flats after closure will be in the neighborhood of $12 million per year, although other post-closure costs, such as payment of benefits to former workers, will be much greater. The organizational responsibility for administering these programs within DOE will lie with LM, which already has staff at Rocky Flats. The DOE RFPO, Kaiser-Hill, and LM have formed transition teams and developed a listing and schedule of transition items to ensure that critical programs such as benefits administration and environmental compliance continue uninterrupted following completion of the closure project.